

Addendum No. 2

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To

**IMPACTED MATERIALS PLACEMENT PLAN
ON-SITE DISPOSAL FACILITY**

**Specialized Placement Plan
for Thorium Impacted Debris**

20100-PL-007

Revision A

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FINAL DRAFT

United States Department of Energy

**Fernald Environmental Management Project
Fernald, Ohio**

Prepared by

**GeoSyntec Consultants
1100 Lake Hearn Drive, NE, Suite 200
Atlanta, Georgia 30342**

Under

**Fluor Daniel Fernald
Subcontract 95PS005028**

Addendum No. 2
To
Impacted Material Placement Plan
On-Site Disposal Facility
Specialized Placement Plan for Thorium Impacted Debris

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In accordance with Section 8, Article 8.6.1 of the Impacted Material Placement (IMP) Plan, Revision 0, dated January 1998 for the On-Site Disposal Facility (OSDF), a specialized placement plan is required to be prepared for "materials either nominally larger than the physical criteria for the OSDF..." or "not reasonably anticipated by currently identified categories...". This specialized placement plan provides requirements and two placement options for placement of Category 2, Category 4, and Category 5 thorium impacted debris. This thorium impacted debris cannot be placed as described in Section 8, Article 8.6.3 of the IMP Plan or as described for bagged material in Addendum No 1, "Specialized Placement Plan for Bagged Impacted Material" because of more restrictive radiological requirements for thorium. Category 1 bagged thorium contaminated impacted materials will be placed in accordance with Addendum No. 1. Category 3 thorium impacted material meeting Waste Acceptance Criteria that are banded and wrapped as per the Fluor Daniel Fernald (FDF) procedures shall be placed in accordance with methods specified in the IMP Plan for Category 3 material.

PLACEMENT REQUIREMENTS

Placement of Category 2, Category 4 and Category 5 thorium impacted debris shall be performed in accordance with Fernald Environmental Management Project (FEMP) radiological safety procedures, the IMP Plan, including fugitive dust control and storm water runoff control, and the Contractor's approved Safe Work Plan. The Contractor's Safe Work Plan shall be revised to include requirements for placement of thorium impacted debris as described in this Addendum No. 2. In addition to the requirements described in the above said documents, thorium impacted debris shall be placed in a manner protective of the health and safety of OSDF personnel and the public, utilizing the As Low As Reasonably Achievable (ALARA) approach and shall meet the OSDF performance criteria stated in the Design Criteria Package for the OSDF.

PLACEMENT OPTIONS

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Thorium impacted debris is expected to be generated as buildings are demolished. Additionally, some thorium impacted debris may be generated in small quantities as other remediation activities are performed. To provide flexibility, two options are specified herein for placement of Category 2, Category 4 and Category 5 thorium impacted debris. These options are specified to minimize radiological potential exposure to personnel and equipment, limit dust generation, control storm water runoff, and place thorium impacted debris in a safe manner. The two placement options are:

- Option 1 - Placement by Grid Method
- Option 2 - Placement by Trenching Method

Selection of the placement option will be made by the Construction Manager based on the quantity of thorium impacted debris that is available for placement and availability of a required grid.

Option 1 - Placement by Grid Method

Thorium impacted debris, except bagged thorium impacted debris, shall be placed by grid method when an estimated quantity of debris for placement is equal to or more than that required to fill half a grid (approximately 220 bcy or more) or when a previously placed minimum 3 ft (0.9 m) thick Category 1 grid is not available for placement by Option 2 trenching method. Bagged thorium impacted debris shall be placed by Option 2 only.

A minimum of two (2) working days prior to commencement of thorium impacted debris placement by grid method, the Construction Manager will select and approve a grid(s). The approved selected grid(s) shall meet the following requirements:

- Grid shall not be located within 100 ft (30m) laterally adjacent to a Category 3 grid in the same horizon
- Grids with thorium contaminated debris placed by the Grid Method shall not be laterally adjacent to each other within the same horizon.
- Grid with thorium contaminated debris placed by the Grid Method and grid with thorium contaminated debris placed by the Trenching Method shall not be adjacent to each other in the same horizon.

- Minimum thickness of Category 1 material under thorium contaminated debris shall be 2 ft (0.6m) or the intervening horizon of Category 1 impacted material, as described in the IMP Plan, whichever is greater.
- Thorium contaminated debris shall not be placed directly on previously placed Category 2 through 5 impacted material, protective layer, or select impacted material layer.
- Thorium contaminated material shall not be placed within 6 ft (1.8m) under the select impacted material for the cap system.
- Only one (1) lift of thorium contaminated debris shall be placed in each grid.

Thorium impacted debris placement in grid(s) shall be in accordance with the following requirements and general procedures and as shown on Figures 1, 2 and 3.

General procedures include:

- Preparation of the grid
- Debris placement
- Initial and additional lifts of Category 1 material

Requirements for each procedure are as follows:

Preparation of the Grid: After a grid is selected and approved, perimeter berms shall be constructed on three sides of the grid, as shown on Figure 1. These berms shall be constructed from Category 1 material; they shall be 24 in (600 mm) high and have a minimum top width of 10 ft (3 m). The berms shall be placed and compacted in 12 inch (300 mm) to 15 inch (375 mm) loose lifts in accordance with the IMP Plan. An additional berm shall be constructed (with the same requirements of the perimeter berms) in the middle of the grid to provide access for a trackhoe (or other equipment) to spread and compact the debris. Until thorium impacted debris placement in the grid is complete, the fourth side shall be left open for truck entrance and exit to and from the grid. The fourth side of the perimeter berm shall be constructed after completion of thorium impacted debris as shown in Figures 2, and 3. The berms shall be compacted to meet at least 90 percent of the standard Proctor maximum dry density as described in the IMP Plan (Section 7.4.2). Compaction shall be tested in accordance with the IMP Plan. The surface of the Category 1 material on which the thorium impacted debris will be placed shall be graded at an approximately 1% slope downward away from the truck entrance and exit

side of the grid. A temporary diversion berm (approx. 18 inches [450 mm] high) shall be constructed approximately 30 ft (9 m) in front of the grid entrance to limit runoff from entering the grid. The grid shall be oriented so that the open side of the grid (fourth perimeter berm) is at the up gradient side of the grid. The required radiological controls for the placement area will be established prior to commencement of thorium impacted debris placement.

Debris Placement: After the grid has been prepared, trucks transporting thorium impacted debris shall dump material at the down gradient end of the grid. Thorium impacted debris shall be spread and tamped by the bucket of a trackhoe (or with an optional tamping plate attachment) to achieve a maximum loose lift thickness of 18 inches (450 mm) \pm 3 inches (75 mm). The trackhoe shall be of sufficient size and reach and be situated in such a way that only the bucket (and tamping plate attachment) shall contact the thorium impacted debris. Compaction, other than tamping from a trackhoe bucket (and tamping plate attachment), shall not be performed directly on the thorium impacted debris. In accordance with the ALARA concept, equipment operators and other personnel shall avoid contact with thorium impacted debris. Also, trucks delivering thorium impacted debris shall not drive on material deposited by the trucks or previously placed thorium impacted debris to minimize the potential for thorium contamination on the outside of the vehicle. A radiological technician will monitor the trucks at the exit to the grid as shown on Figure 1. Fugitive dust and storm water runoff controls shall be in accordance with the IMP Plan. Water trucks and/or water hoses shall be available at the location of placement activities.

Initial and Additional Lifts of Category 1 Material: As the debris placement progresses, an initial 15 inches (375 mm) \pm 3 inches (75 mm) loose lift of Category 1 material (soil and soil-like material) shall then be placed on top of the thorium impacted debris by the end of each working day. The initial lift shall be compacted with a minimum of four one-way passes of a self-propelled double drum roller compactor, a smooth drum vibratory roller or other compaction equipment approved by the Construction Manager. No compaction testing will be performed on the initial lift above the thorium impacted debris. As shown in Figures 2 and 3, the fourth side of the perimeter berm will be constructed after thorium impacted debris placement is completed. After the fourth side of the perimeter berm has been placed and initial lift is placed over the thorium contaminated debris, the temporary diversion berm to control storm water runoff shall be removed. An additional 12 inches (300 mm) \pm 3 inches (75 mm) loose lift(s) of Category 1 material shall be placed above

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the initial lift. Total compacted thickness of Category 1 material placed above the thorium impacted debris, including the initial lift, shall be minimum 2 ft (0.6m) or at least as thick as the intervening horizon described in the IMP, whichever is greater. See attached Figure 3. The Category 1 lift(s) above the initial lift shall be compacted to meet at least 90 percent of the standard Proctor maximum dry density. Compaction of the additional lift(s) shall be tested in accordance with the IMP Plan.

Option 2 – Placement by Trenching Method

Thorium impacted debris shall be placed by trenching method when the debris is bagged or when the estimated quantity of debris will be less than the quantity required to fill a half grid (less than approximately 220 bcy) and a previously placed minimum 3 ft (0.9 m) thick Category 1 grid is available for placement of the thorium impacted debris.

A minimum of two (2) working days prior to commencement of thorium impacted debris placement by the trenching method, the Construction Manager will select and approve a previously placed minimum 3 ft (0.9 m) thick Category 1 grid. The trench for placement of thorium impacted material by this method shall meet the following requirements:

- Grid shall not be located within 100 ft (30m) laterally adjacent to a Category 3 grid in the same horizon.
- Grids with thorium contaminated debris trenches shall not be laterally adjacent to each other within the same horizon.
- Grid with thorium contaminated debris placed by the Grid Method and grid with thorium contaminated debris placed by the Trenching Method shall not be adjacent to each other in the same horizon.
- A trench for thorium contaminated debris shall not be excavated in previously placed Category 2 through 5 impacted material, protective layer, or select impacted material layer.
- A trench for thorium contaminated material shall not be excavated within 6 ft (1.8m) under the select impacted material for the cap system
- Only one (1) lift of thorium contaminated debris shall be placed in each grid.
- Minimum thickness of Category 1 material under thorium contaminated debris trench excavation shall be 2 ft (0.6m) or the intervening horizon of Category 1 impacted material, as described in the IMP Plan, whichever is greater.

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Thorium impacted debris placement in a trench shall be in accordance with the following requirements and general procedures and as shown on Figure 4. - 2483

General procedures include:

- Trench Excavation
- Debris Placement
- Initial and Additional Lifts of Category 1 Material

Requirements for each procedure are as follows:

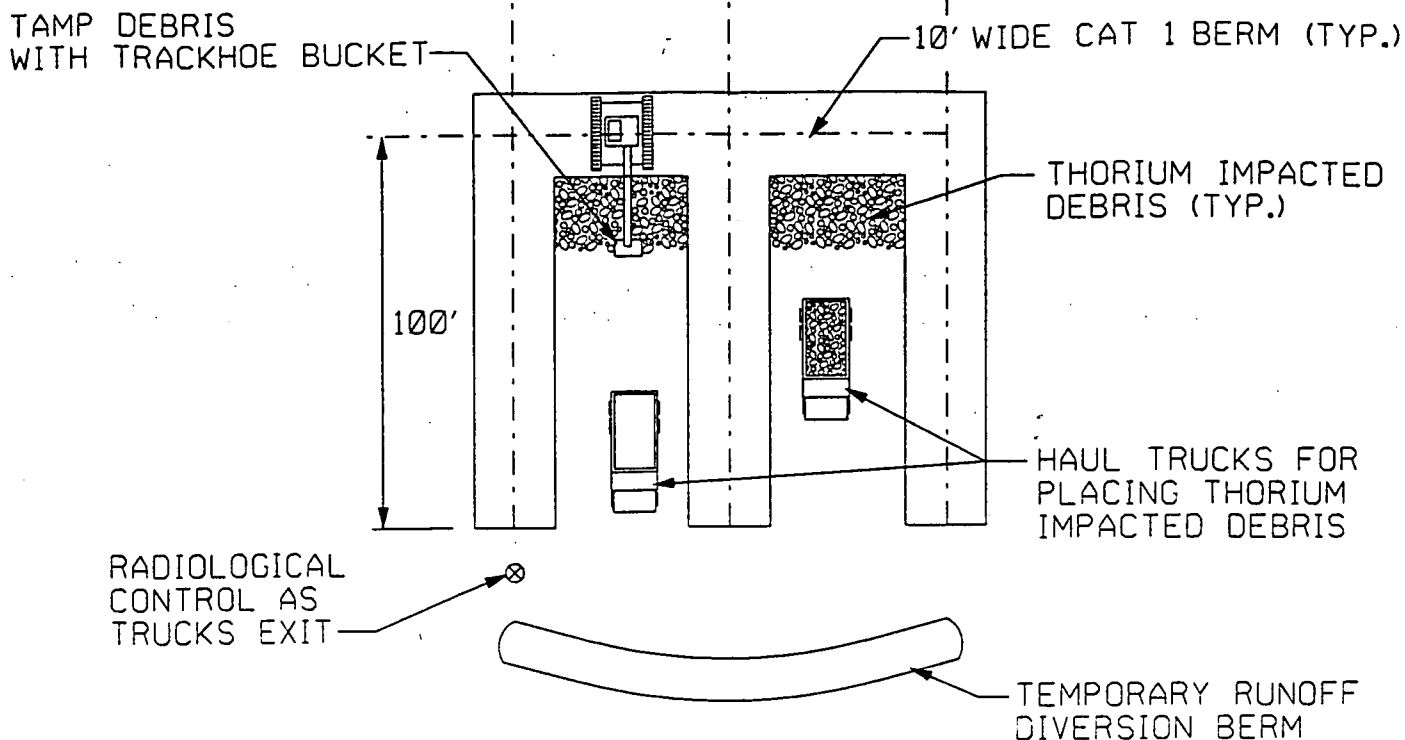
Trench Excavation: After a grid(s) is selected and approved, a trench (or trenches) shall be excavated as shown on Figure 4. Each trench shall be a minimum of 3 ft (0.9 m) deep and a maximum of 4 ft (1.2 m) deep and between 8 ft (2.4 m) and 12 ft (3.6 m) wide. A minimum 6 ft (1.8 m) distance shall be maintained between top of the side slopes of the adjacent trench. One end of the trench shall be graded to a minimum 5H:1V ramp (subject to approval by FDF Safety Engineer) for truck access into the trench. The trench bottom shall be graded at an approximately 1% slope downward away from the truck access ramp. The maximum trench length shall be approximately 70 ft (21 m) and shall be limited by the maximum length that can be excavated in one grid and still provide adequate access to enter and exit the trench. The Category 1 material excavated from the trench shall be stockpiled a minimum of 6 ft (1.8 m) from the top of the side slopes of the trench and shall be used later for initial and additional lifts over the thorium impacted debris. The necessary radiological controls will be established prior to commencement of thorium impacted debris placement.

Debris Placement: After the trench is excavated, trucks transporting thorium impacted debris shall back down the ramp and begin dumping material at the furthest end of the trench. Thorium impacted debris shall be spread and tamped by the bucket of a trackhoe (or with an optional tamping plate attachment) to achieve a maximum loose lift thickness of 18 inches (450 mm) \pm 3 inches (75 mm). The trackhoe shall be situated in such a way that only the bucket (and tamping plate attachment) shall contact the thorium impacted debris. Compaction, other than tamping from a trackhoe bucket (and tamping plate attachment), shall not be performed directly on the thorium impacted debris. Equipment operators and other personnel shall avoid contact with thorium impacted debris in

accordance with the ALARA concept. Trucks delivering thorium impacted debris shall not drive on material deposited by the trucks or previously placed thorium impacted debris to minimize the potential for thorium contamination on the outside of the vehicle. A radiological technician will monitor the trucks at the exit to the trench as shown on Figure 4. Fugitive dust and storm water runoff controls shall be in accordance with the IMP Plan. Water trucks and/or water hoses will be available at the location of placement activities.

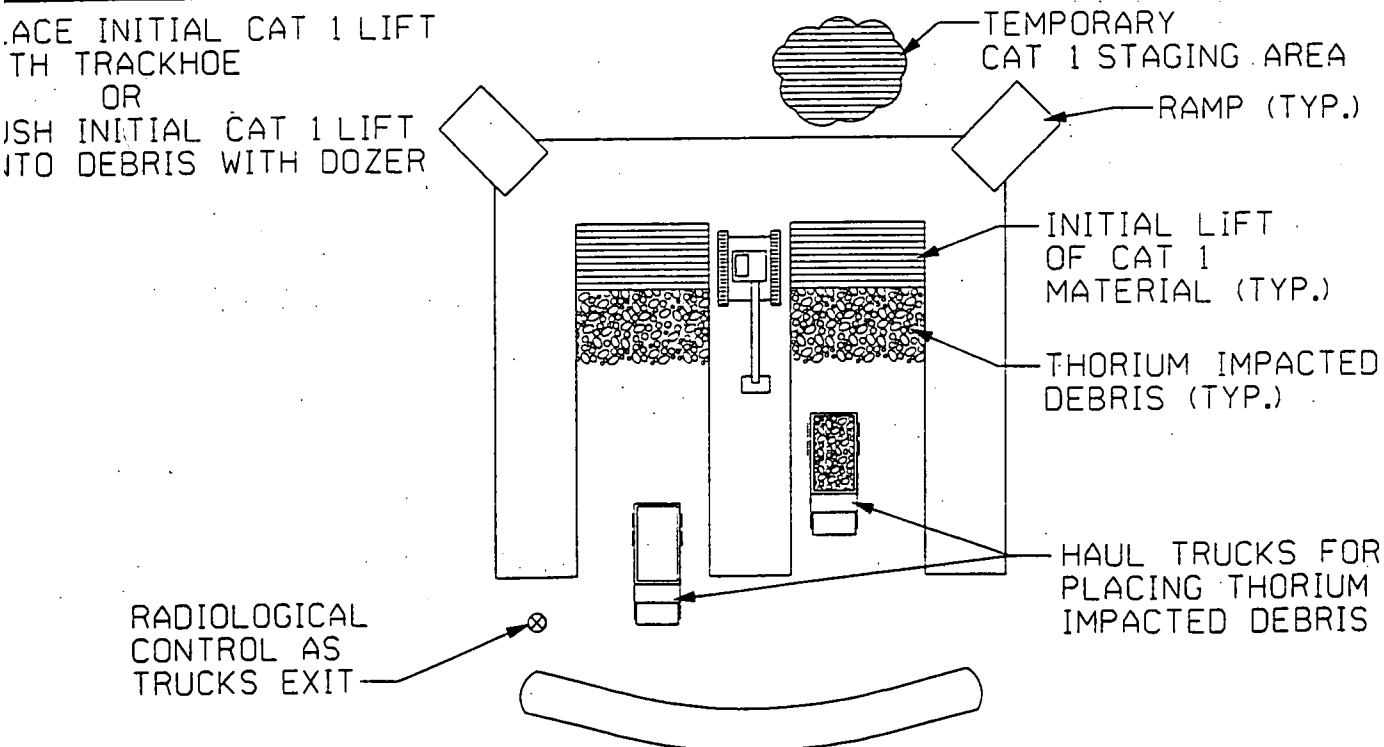
Initial and Additional Lifts of Category 1 Material: After thorium impacted debris is placed in the trench and compacted, it shall be covered with an initial 15 inches (375 mm) \pm 3 inches (75 mm) loose lift of Category 1 material by the end of each working day. The initial lift shall be compacted with a minimum of four one-way passes of a self-propelled double drum roller compactor, a smooth drum vibratory roller or other compaction equipment approved by the Construction Manager. No compaction testing will be performed on the initial lift above the thorium impacted debris. An additional 12 inches (300 mm) \pm 3 inches (75 mm) loose lift(s) of Category 1 material shall be placed above the initial lift. Total compacted thickness of Category 1 material placed above the thorium impacted debris, including the initial lift, shall be a minimum 15 inches (375 mm) as shown on attached Figure 4. The Category 1 lift(s) above the initial lift shall be compacted to meet at least 90 percent of the standard Proctor maximum dry density. Compaction of the additional lift(s) shall be tested in accordance with the IMP Plan. Category 1 material shall subsequently be placed in accordance with the IMP Plan to a minimum thickness of 2 ft (0.6m) or the intervening horizon as described in the IMP Plan, whichever is greater; as shown on Figure 4.

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PLACING THORIUM IMPACTED DEBRIS IN GRID

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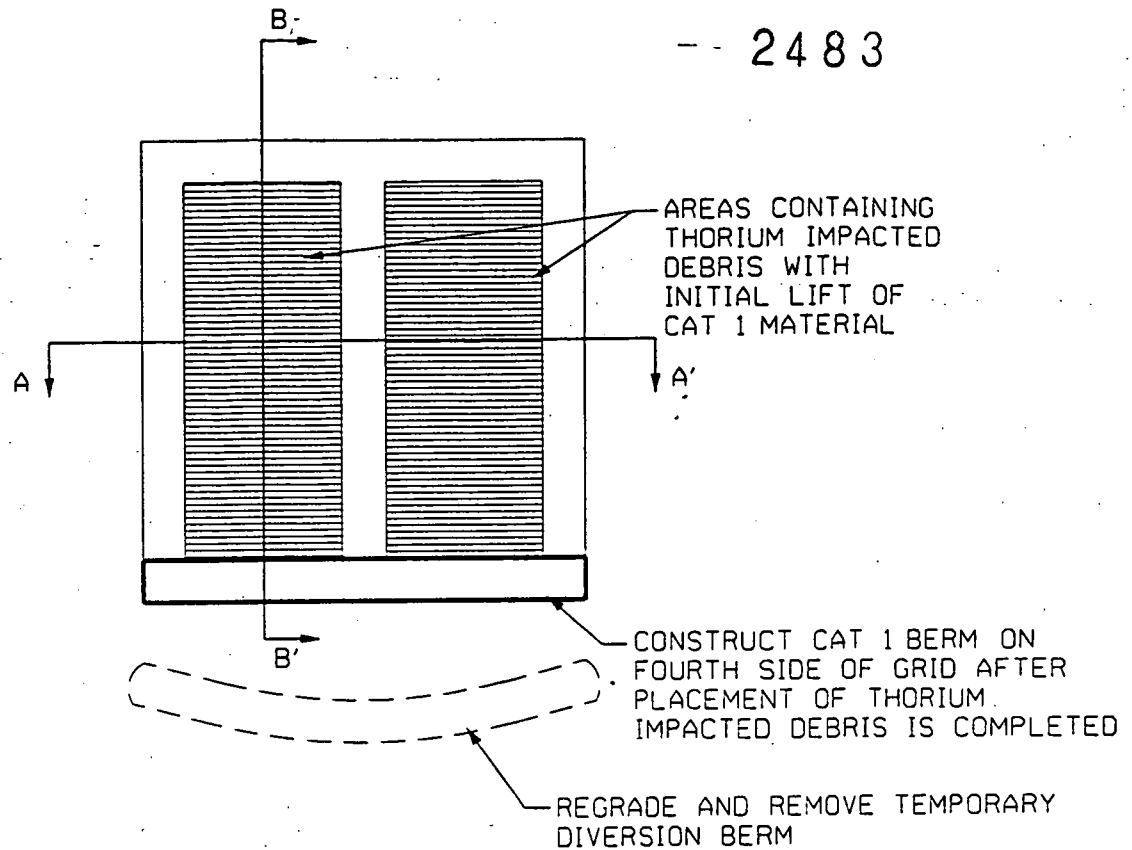


COVERING THORIUM IMPACTED DEBRIS

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FIGURE 1
THORIUM IMPACTED DEBRIS PLACEMENT
OPTION 1 - GRID METHOD
PLAN VIEW
SHEET 1 OF 3

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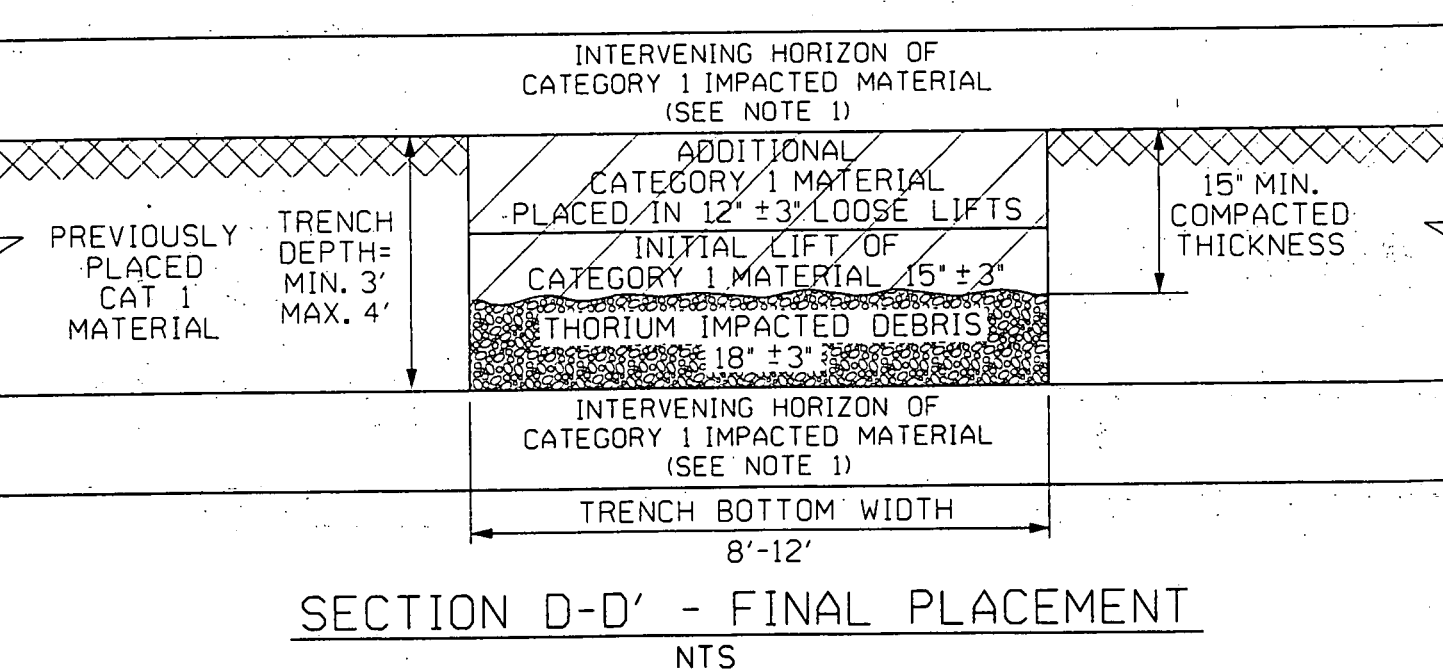
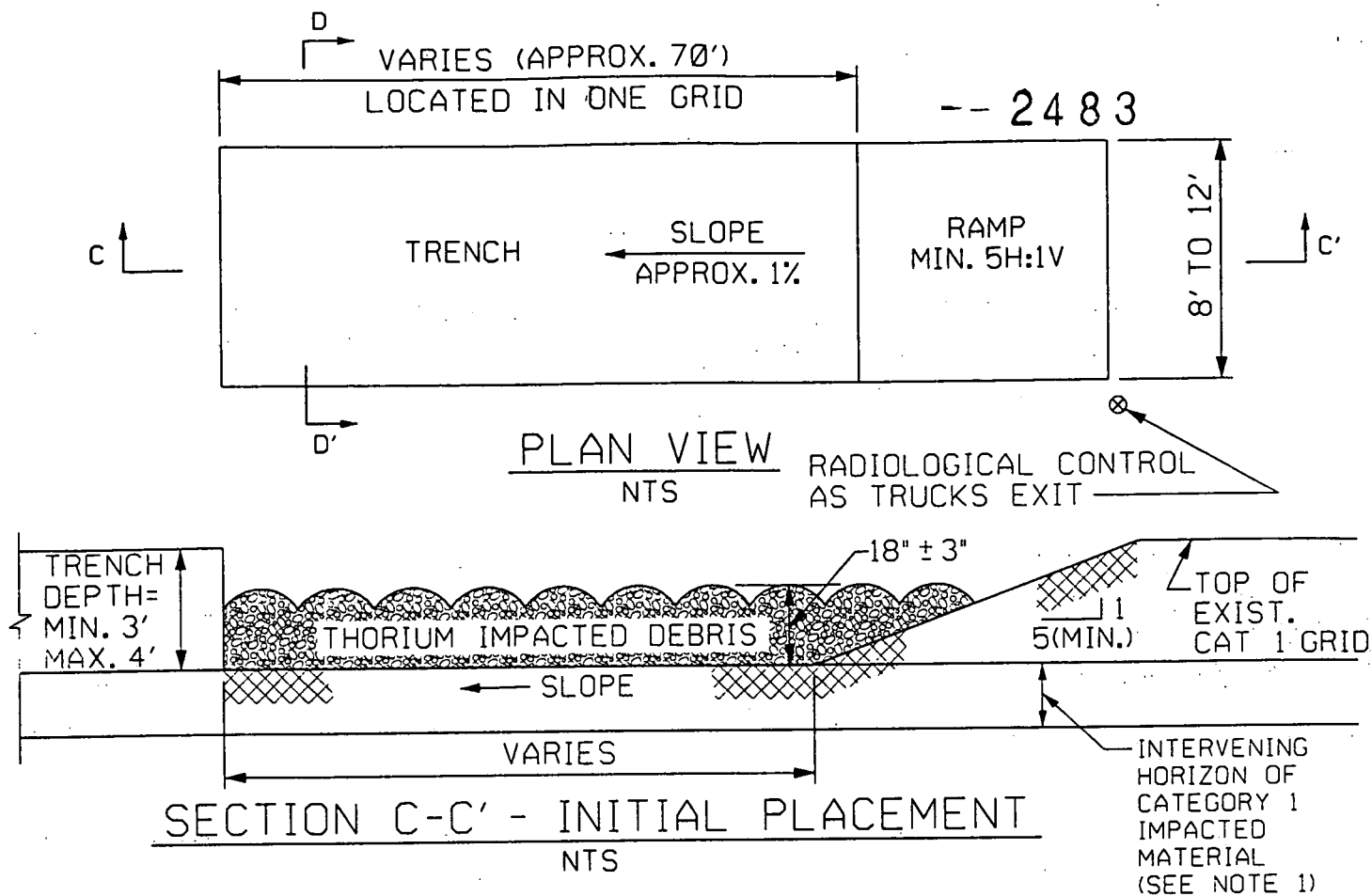
COMPLETION OF THORIUM IMPACTED DEBRIS GRID
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NOTES: SEE FIGURE 3 (SHEET 3 OF 3) FOR AA' AND BB' CROSS SECTIONS.

FIGURE 2
THORIUM IMPACTED DEBRIS PLACEMENT
OPTION 1 - GRID METHOD
PLAN VIEW
SHEET 2 OF 3

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Figures.000



NOTES:

1. COMPACTED THICKNESS OF MINIMUM 2 FEET OR THICKNESS OF INTERVENING HORIZON OF CATEGORY 1 MATERIAL AS DESCRIBED IN IMPACTED MATERIAL PLACEMENT PLAN; WHICHEVER IS GREATER.

FIGURE 4
THORIUM IMPACTED DEBRIS PLACEMENT
OPTION 2 - TRENCHING METHOD
SHEET 1 OF 1